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BAQ Engineering Services Division

Company Name:	Shaw Industries Group, Inc. (Plant 78)	Permit Writer:	James C. Robinson
Permit Number:	CM-0080-0101	Date:	DRAFT

DATE APPLICATION RECEIVED: Conditional Major Renewal received September 26, 2016.

DATE OF LAST INSPECTION: Since issuance of the last permit renewal (October 25, 2011), the facility has had three inspections (all comprehensive), with the last one being December 22, 2014. All three reports show that there were no violations observed.

FACILITY DESCRIPTION Shaw Industries Group, Inc. (Plant 78) (Shaw) manufactures Nylon 6 continuous filament fibers. Nylon 6 production begins with caprolactam monomer polymerization. The resulting polymer is passed through a pelletizing dye head and counter-flow quench wash column, dried, and transferred to storage. Nylon 6 filaments are then created from the polymer chips through a melt spinning process that uses heat to melt the polymer to a viscosity suitable for extrusion through a spinneret. The extruded monofilaments are quenched and gathered together to form a single multi-filament fiber strand. The fibers then undergo a mechanical process called spin draw texturing (SDT) that stretches, bulks and orients the strands to produce desired properties. Finally, the fibers undergo a twisting and a heat-setting process to 'set' the twist memory of the fiber. The yarn is then spooled and shipped to other Shaw plants for use in the fabrication of carpet.

Shaw currently has two polymerization reactors (PT-1 and PT-2), two banks of melt spin extruders (EB-1, EB-2), two spin draw texturizer lines (TB-1, TB-2) and eleven Suessens (SS-1 through SS-11). There are two 25.1 MM Btu/hr boilers (B-1, B-2) that supply steam to the heat-setting and polymerization processes. These units combust natural gas and fuel oil. Emissions from the extruder banks and Suessens are vented to wet scrubbers (WS-1, WS-2, and WS-3) for volatile organic compound (VOC) and caprolactam control, and odor abatement.

PROJECT DESCRIPTION The facility is requesting the renewal of its conditional major (CM) permit.

CHANGES SINCE LAST OP ISSUANCE

Date	Description
2/5/14	Revision to incorporate an exemption approved on September 25, 2013 to increase yarn feed rates and production of the eleven (11) Suessen machines (Unit ID 03). Equipment Table Part 5.C.03.a For Unit ID 03 Heat Setting Units, Equipment ID's SS1 - SS7 increased capacity from 600 lb/hr to 1,150 lb/hr and SS8-SS11 increased from 800 lb/hr to 1,150 lb/hr.
3/6/14	Revision to correct the eleven (11) Suessen Heatsetting Units nylon production limit. Condition 5.C.03a production limit was changed from 65.7 million to 110 million pounds per year (12 month rolling sum) production of nylon 6 (sum of all eleven (11) lines).
10/21/14	Facility replaced voluntary control devices WS-1 and WS-2, as a non-PSD like for like replacement.
1/21/15	Revision to include requirements related to SC Regulation 61-62.5, Standard 5.2 applicability, due to low NO _x burner assembly replacements on existing boilers. Revision also includes updated SO ₂ limits per SC Regulation 61-62.5, Standard 1.
During Renewal	<ul style="list-style-type: none">Removed Standard 5.1 limits and conditions.Removed the synthetic minor limit of less than 100 tpy of SO₂ for PSD and Title V avoidance.Removed specific limits and conditions for Unit ID 03 that were used to show compliance with the federally enforceable VOC limit of less than 100 tpy for PSD and Title V avoidance.

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- Remove the condition limiting production for Unit ID 01. The facility has a federally enforceable VOC limit of less than 100 tpy to avoid PSD and Title V.
- The exempted Beringer Cleaning Oven (ID EX-H) was replaced with a natural gas fired Steelman Pre-Heat Oven.
- Removed the following exempt sources, as they are no longer at the facility.

Equipment ID	Equipment Description
EX-A	Propane Tank
EX-F	16 Superba TVP Heating Machines
EX-K	2 Cleaning Ovens

- The facility submitted a non-PSD like for like replacement request (received August 1, 2017) to replace Suessen Heatsets No.1 and No. 2 (Equipment IDs SS-1 and -2, respectively) with newer units from another Shaw facility. This request is being incorporated into the conditional major renewal.
- Changed Equipment ID's for the Suessen Heatsets Units in ID 03 to reflect the facility's internal Equipment ID's.

Equipment Description	Old Equipment ID	New Equipment ID
Suessen Heatsetting Unit No.1	SS-1	S
Suessen Heatsetting Unit No.2	SS-2	Z
Suessen Heatsetting Unit No.3	SS-3	P
Suessen Heatsetting Unit No.4	SS-4	O
Suessen Heatsetting Unit No.5	SS-5	X
Suessen Heatsetting Unit No.6	SS-6	M
Suessen Heatsetting Unit No.7	SS-7	N
Suessen Heatsetting Unit No.8	SS-8	Q
Suessen Heatsetting Unit No.9	SS-9	L
Suessen Heatsetting Unit No.10	SS-10	K
Suessen Heatsetting Unit No.11	SS-11	R

- Removed yellow grease as a fuel for the boilers. The facility no longer burns yellow grease.

SOURCE TEST REQUIREMENTS

The facility is currently required to conduct performance test every 2 years to verify VOC emissions from Wet Scrubber No.3. The last performance test was conducted January 21, 2016; and showed compliance with the less than or equal to 1.83 lb/hr limit for caprolactam. The control efficiency during the test was 93.7%. Note that 1.83 lb/hr VOC limit is being removed during this renewal. (See Regulatory Applicability



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Review below)

No performance test is required for Wet Scrubbers No. 1 and No. 2, because these units are voluntary control devices. Their voluntary status was designated during the last permit renewal on October 25, 2011.

EMISSIONS

Emissions were checked and verified. VOC (caprolactam) emissions have decreased from last permit renewal due to a lower emission factor for caprolactam and a higher scrubber efficiency. With the use of ultra low sulfur diesel fuel (ULSD), the facility no longer has the PTE of greater than 100 tpy of SO₂.

FACILITY WIDE EMISSIONS		
Pollutant	Uncontrolled Emissions	Controlled/Limited Emissions
	TPY	TPY
PM	5.17	N/A
PM ₁₀	3.61	N/A
PM _{2.5}	2.45	N/A
SO ₂	0.35	N/A
NO _x	20.4	N/A
CO	18.1	N/A
VOCs (Combustion)	1.18	N/A
VOCs (Process)	88.95	38.18/<100
Caprolactam (T, V)*	89.95	38.18

T = Toxic Air Pollutant; V = VOC

* All VOC is assumed to be Caprolactam

OPERATING PERMIT STATUS

The facility is a conditional major facility due to federally enforceable limits of less than 100 tpy VOC emissions. The previous conditional major permit was issued October 25, 2011, and expired December 31, 2016.

REGULATORY APPLICABILITY REVIEW

Regulation	Comments/Periodic Monitoring Requirements
Section II.E - Synthetic Minor	<p>This facility has a synthetic minor limit for VOC emissions of less than 100 tpy for PSD and TV avoidance. The facility also has PSD and Title V avoidance limits for SO₂ of less than 100 tpy, each; however, these SO₂ limits are being removed during this renewal. The facility's SO₂ emissions have greatly reduced due to the use of ULSD fuel.</p> <p>Because the facility now has a facility wide pollutant based limit, the following synthetic minor limits pertaining to the Heat Setting Units will no longer be required. A total production limit of 110 million pounds per year (12 month rolling sum) of nylon 6, a VOC emissions limit of 1.83 lb/hr, and a percent volatiles (by weight or volume) of the finish emulsions of less than 10%.</p>
Standard No. 1	Boilers Nos.1 and 2 each has PM (0.6 lbs/million Btu input), SO ₂ (2.3 lbs/million Btu input), and Opacity (20%) limits imposed by this standard.



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Regulation	Comments/Periodic Monitoring Requirements
Standard No. 3 (state only)	Cleaning ovens SP-01 and SP-02 are classified as industrial incinerators because each is used to burn waste polymer (Type 6 waste) off metal parts. The total design capacity for each is less than 1.0×10^6 Btu/hr including auxiliary devices. Therefore, per Section I.3, the ovens are exempt from all requirements of this standard except 20% opacity limits, and maintaining records of the contaminant being removed and possible emissions from the process.
Standard No. 4	This facility does not have any process PM emissions, and therefore, Section VIII is not applicable. All emission sources are subject 20% opacity limits according to Section IX(B), since they were installed after 1985.
Standard No. 5	This facility was not in existence in 1979 or 1980.
Standard No. 5.1	Standard 5.1 was repealed on June 26, 2015. The facility stated that they submitted an administrative amendment requesting the removal Standard 5.1 on June 2015; however, the amendment was not found during review of BAQ files and databases. The facility submitted an amendment during this renewal (Received July 28, 2017). The removal of this limit will not trigger any new regulations, as the facility continues to maintain a synthetic minor limit for VOCs of less than 100 tpy to avoid PSD and Title V.
Standard No. 5.2	Boilers No. 1 and 2 were constructed prior to 2004 and had their burner assemblies replaced after June 25, 2004 (replaced in 2015). The boilers are subject to NO _x limits and tune-up requirements. No other units are subject to this standard at this time.
Standard No. 7	<p>This facility is specified as one of the 28 specific industry types (28xx SIC Codes) for PSD applicability which specifies a PSD major threshold of 100 tpy. Uncontrolled VOC emissions are each greater than 100 tpy, however, the facility has taken federally enforceable limits of less than 100 tpy for PSD avoidance.</p> <p>The statement of basis for Construction Permit 0080-0101-CM states that this facility took production limits to avoid PSD for VOC emissions. The VOC emissions were from the installation of the original Suessen heat setting units in Construction Permit 0080-0101-CC.R1 issued on May 10, 1995. Compliance was demonstrated by limiting production and limiting the percent volatiles (by weight or volume) of the finish emulsions to less than 10%.</p> <p>A facility wide PSD VOC avoidance limit of less than 100 tpy was established during the last conditional permit renewal (October 25, 2011). Compliance with the VOC limit will continue to be demonstrated through recordkeeping, and the proper operation and source testing (every 2 years) of Wet Scrubber No.3.</p> <p>As noted above in the Synthetic Minor section, the specific limits and conditions previously used to show compliance with this standard will be removed from the Conditional Major Permit, since the facility has a facility wide VOC limit of less than 100 tpy for PSD avoidance.</p>
61-62.6	This facility does not have fugitive PM (Dust) emissions.



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Regulation	Comments/Periodic Monitoring Requirements
40 CFR 60 and 61-62.60	Boilers Nos. 1 and 2 are subject to Subpart A and Subpart Dc. The facility chose to comply with applicable SO ₂ requirements by limiting the fuel oil sulfur content to less than 0.5%. The facility will meet this limit because all #2 fuel oil is federally mandated to be 0.0015% sulfur. The Fuel Oil Storage Tank is not subject to Subpart Kb, because its capacity is 20,000 gallons (75.7082 m ³) which is between 75 m ³ and 151 m ³ , and has a vapor pressure less than 15.0 kPa.
40 CFR 61 and 61-62.61	This facility is not subject to any standards from this regulation because it does not emit any of the pollutants regulated by these standards.
40 CFR 63 and 61-62.63	This facility does not emit any process HAPs. The boilers are potentially subject to Subpart 6J "NESHAP for Commercial, Industrial, and Institutional Boilers at Area Sources". However, the boilers are exempt from this subpart per 40 CFR 63.11195, because they are gas-fired boilers (as defined in 40 CFR 63.11237).
61-62.68	This facility does not store or use chemicals subject to this regulation above the threshold quantities.
40 CFR 64	This is not a Title V facility.

AMBIENT AIR STANDARDS REVIEW

Regulation	Comments/Periodic Monitoring Requirements
Standard No. 2	The facility has demonstrated compliance with these Standards. See modeling summary dated 8/25/17.
Standard No. 7.c	
Standard No. 8 (state only)	

PUBLIC NOTICE

This Conditional Major Permit will undergo a 30-day public notice period in accordance with SC Regulation 61-62.1, Section II.N. The comment period was open from September 8, 2017 to October 7, 2017 and was placed on the BAQ website during that time period.

SUMMARY AND CONCLUSIONS

It has been determined that this source, if operated in accordance with the submitted application, will meet all applicable requirements and emission standards.